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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/822,275	04/08/2004	Jeffery W. Janzen	501286.01 (30262/US)	2177
7590 Edward W. Bulchis, Esq. DORSEY & WHITNEY LLP Suite 3400 1420 Fifth Avenue Seattle, WA 98101			EXAMINER WALTER, CRAIG E	
			ART UNIT 2188	PAPER NUMBER
			MAIL DATE 05/31/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/822,275

Applicant(s)

JANZEN, JEFFERY W.

Examiner

Craig E. Walter

Art Unit

2188

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 April 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>1/24/07</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 16 April 2007 has been entered.

Status of Claims

2. Claims 1-30 are pending in the Application.
Claims 10, 14, 21, 26 and 27 are amended.
Claims 1-30 are rejected.

Response to Amendment

3. Applicant's amendments and arguments filed on 16 April 2007 in response to the office action mailed on 11 December 2006 have been fully considered, but they are not persuasive. Therefore, the rejections made in the previous office action are maintained, and restated below, with changes as needed to address the amendments.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

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The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 8, 10-30 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

As for claims 10, 14, 21, 26, 27 and 29, the phrases, "substantially abutting", "substantially perpendicular" and "substantially parallel edges of the circuit board" render the claims indefinite, as one of ordinary skill in the art would be unable to determine the metes and bounds of these limitations (i.e. one of ordinary skill in the art would be unable to ascertain what angle constitutes an object being "substantially parallel" with respect to its counterpart, and likewise what angle constitutes an object being "substantially perpendicular" with respect to its counterpart (is "substantially parallel" to mean "more parallel than perpendicular?" If so, is a 45 degree angle "substantially perpendicular", "substantially parallel", neither, or both?)) Additionally, one of ordinary skill in the art would be unable to ascertain how close two objects must be located before they are "substantially abutting." The specification fails to provide any standard for ascertaining the requisite degree to which the term "substantially" limits each of these three descriptors, hence the scope cannot be fully understood, rendering the claim indefinite. Additionally, it is worthy to note that it appears Applicant amended claims 10, 14, 21 and 26 with "substantially" language in order to distinguish them over the previously cited prior art. It is therefore absolutely imperative for Examiner to fully appreciate the meaning of "substantially parallel",

substantially perpendicular" and "substantially abutting", *in light of the original specification*, in order to determine if such an amendment in fact overcome the cited art. The claims are therefore indefinite; as Examiner cannot properly construe the scope of these claims in present their form.

Claims 8 and 19 recite the limitation "the data bus" in line 2 of the claim. There is insufficient antecedent basis for this limitation in the claim, as a plurality of data busses are previously set forth in these claims (i.e. each memory device includes a data bus). Which bus is being referenced by the phrase "the bus" in these claims?

The remaining claims further limiting claims 10, 21 or 26 are rejected for inheriting the deficiencies of each of their respective base claims.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ryan (US PG Publication 2004/0044833 A1), in further view of Schumacher et al. (US Patent 5,502,621), hereinafter Schumacher.

As for claims 1, 10, 21, and 26, Ryan teaches a memory module comprising:

- a data input device (Fig. 3 (311));
- a data output device (Fig. 3 (312));
- a processor coupled to the data input and data output devices (Fig. 3 (304));
- memory modules comprising:
 - a circuit board (Fig. 3 (201));
 - a plurality of memory devices positioned around a memory hub (Fig. 3 (memory devices (212, 214, ...); hub (208))) on the same side of a circuit board; and
 - an edge connector positioned along an edge of the circuit board (paragraph 0006, all lines – Ryan discusses DIMM devices which contain edge connectors – see also claim 12 of Ryan).

Despite these teachings Ryan fails to teach each memory device being positioned in a pairs, in which the paired devices are arranged such that each respective device has the same pinout, yet one is rotated 180 degrees with respect to the board such that first and second sets of functional pins are adjacent (and substantially abutting) to each other.

Schumacher however teaches arranging ICs in a paired configuration such that one device is rotated 180 degrees with respect to the board – Fig. 4, devices 410 and 415 are ICs with the same pinout, just mirrored with respect to the vertical axis (i.e. 180

degree rotation). Schumacher teaches this configuration in order to keep similar functional pin groupings together (col. 3, lines 40-56). Note Schumacher teaches pairs of ICs that substantially abut each other (see Fig. 4).

It would have been obvious to one of ordinary skill in the art at the time of the invention for Ryan to further include Schumacher's system of mirrored pin assignment for two sided multi-chip layout into his own system and method for optimizing interconnections of memory devices in a multichip module. By doing so, Ryan would be able to connect the memory devices of his memory system with a more simplified lead routing scheme, which in turn would lead to a reduction of the number of layers in the PCB as taught by Schumacher in col. 2 lines 35-39.

As for claims 3, 12, and 22, Ryan teaches the memory module of claim 1 wherein the memory devices comprise DRAMs (paragraph 0004, all lines).

As for claim 23, Ryan teaches the computer system of claim 21 wherein the memory modules are coupled in a daisy chain manner to the controller (referring to Fig. 4, each memory module (201, 302) is connected to the controller (not shown in this figure, but shown in Fig. 2 (200), in a daisy chained fashion via a connecting bus (401))).

As for claim 24, Ryan teaches the computer system of claim 21 wherein the high-speed data link comprises an optical communications link (paragraph 0019, all lines).

As for claim 29, Ryan teaches the method of claim 26 wherein a data bus is routed between the hub and each device, and wherein signal lines of the data bus are

routed substantially parallel edges of the circuit board (referring to Fig. 2, each bus (230, 232) is routed parallel with the edges of the board).

As for claim 30, the Ryan discloses the method of claim 26 wherein a control-address bus is routed between the hub and one device in each pair (Fig. 2, each bus is routed to one device. The bus contains control and data signals), and wherein signal lines of the control-address bus as being routed diagonally outward from the hub towards corners of the circuit board (though Ryan does not explicitly teach signal lines of the control-address bus are routed diagonally outward from the hub towards corners of the circuit board, such a limitation is merely a matter of design choice and would have been obvious in the system of Ryan. The mere routing of the signal lines (either orthogonally, or diagonally) fails to define a patentably distinct invention over Ryan since both the instant invention as a whole, and Ryan's teachings are directed to optimizing the connections in multi-chip modules).

As for claims 4 and 13, Ryan teaches a DIMM device (which contains connectors on the edges of both sides of the board – paragraph 0006, all lines and claim 12 of Ryan).

As for claims 7, 9, 18, 20 and 25, Ryan teaches module includes eight pairs of memory devices, they fail to teach four pairs positioned on a front side of the circuit board and four pairs positioned on a back side of the circuit board, each pair on the front side being positioned adjacent a corresponding pair on the back side, and wherein the eight pairs of memory devices comprise a single rank on the memory module (Ryan discloses a DIMM device with varying number of chips – paragraph 0006, all lines and

claim 12 of Ryan. A DIMM device by definition contains memory devices on both sides of a PCB).

As for claims 8 and 19, though Ryan in fact teaches a memory bus which is 64 bits wide (paragraph 0008, all lines)), he fails to specifically teach a bus with half of them as 4-bits wide, and the remaining half 5-bits wide as recited in these claims. It would however have been obvious to one of ordinary skill in the art for Ryan to use a bus for his memory containing more or less than 64 bits (i.e. half of them with a 4-bit wide bus, and half with a 5-bit bus). Ryan's system would benefit using a smaller bus width bits by increasing the aerial density of his PCB, since less trace lines would be required to transfer data between the memory and the hub. The limitation of using a 4-bit or 5-bit wide memory bus (rather than 64 as expressly taught by Ryan) fails to define a patentably distinct invention over Ryan, since both the instant invention as a whole and Ryan's teachings are directed to optimizing the connections in multi-chip modules.

As for claims 6 and 15, though Ryan fails to specifically teach a memory bus as being 9-bits wide (he in fact teaches a memory bus, which is 64 bits wide (paragraph 0008, all lines)), it would have been obvious to one of ordinary skill in the art for Ryan to use a bus for his memory containing more or less than 64 bits. Ryan's system would benefit using a smaller bus width bits by increasing the aerial density of his PCB, since less trace lines would be required to transfer data between the memory and the hub. The limitation of using an 18-bit wide memory bus (rather than 64 as expressly taught by Ryan) fails to define a patentably distinct invention over Ryan, since both the instant

invention as a whole and Ryan's teachings are directed to optimizing the connections of multi-chip modules.

As for claim 16, Ryan teaches his modules includes a first pair of memory devices positioned adjacent a respective edge of the circuit board and a second pair positioned adjacent an diagonal opposite edge of the circuit board (Fig. 2., each memory pair (i.e. 212, 214) is arranged adjacent a pair located on a second edge of the board (i.e. 222, 220). Note, Though Ryan does not explicitly teach pairs of memory devices as being opposite on a diagonal from each other (rather they are opposite with respect to a horizontal and/or vertical axis), such a limitation is merely a matter of design choice and would have been obvious in the system of Ryan. The mere positioning of opposite pairs (either being opposites with respect to a horizontal or diagonal axis of the board) fails to define a patentably distinct invention over Ryan since both the instant invention as a whole and Ryan's teachings are directed to optimizing the connections of multi-chip modules.

As for claim 17, though Ryan teaches his memory bus as being 64-bits wide rather than 18-bits as claimed by Applicant, (paragraph 0008, all lines), it would have been obvious to one of ordinary skill in the art for Ryan to use a bus for his memory containing more or less than 64 bits (i.e. 18 bits). Ryan's system would benefit using a smaller bus width bits by increasing the aerial density of his PCB, since less trace lines would be required to transfer data between the memory and the hub. The limitation of using an 18-bit wide memory bus (rather than 64 as expressly taught by Ryan) fails to define a patentably distinct invention over Ryan, since both the instant invention as a

whole and Ryan's teachings are directed to optimizing the connections of multi-chip modules.

As for claims 2 and 11, Schumacher teaches a memory module wherein the first functional group of signals comprise data signals and the second functional group of signals comprise control-address signals (col. 3, lines 40-56).

As for claims 5, and 14, Ryan teaches the modules as including devices, each pair being positioned substantially perpendicular to adjacent pairs and located adjacent to a respective edge of the circuit board (see Fig. 3 – note though 8 devices are shown, the number could be more or less per paragraph 0021, final 11 lines of this paragraph). Also note Ryan teaches pairs and being perpendicular with respect to each other (Fig. 2, memory pairs are located at 90 degree angles with respect to each of the four side). Despite these teachings, he fails however to teach the devices as being arranged in pairs, such that the first functional group of signals comprising data signals and the second functional group of signals comprising control-address signals. Schumacher however teaches this very configuration (as per the rejection of claims 1 and 2).

As for claim 27, Schumacher teaches the method of claim 26 wherein each memory device includes a pin 1 designated end and a first functional group of signals are adjacent this end of the device, and wherein the devices in each pair are positioned with the pin 1 designated ends substantially abut one another (just as stated above for the rejection of claim 2, the memory devices are arranged to keep similar functional pins together – col. 3, lines 40-56).

As for claim 28, Schumacher teaches the method of claim 27 wherein the first functional group of signals comprises data bus signals (as per the rejection of claim 2).

It would have been obvious to one of ordinary skill in the art at the time of the invention for Ryan to further include Schumacher's system of mirrored pin assignment for two sided multi-chip layout into his own system and method for optimizing interconnections of memory devices in a multichip module. By doing so, Ryan would be able to connect the memory devices of his memory system with a more simplified lead routing scheme, which in turn would lead to a reduction of the number of layers in the PCB as taught by Schumacher in col. 2 lines 35-39.

Double Patenting

6. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422

F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

7. A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

8. Claims 1-30 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 37 of copending Application No. 11/417,389 (hereinafter Application '379) in view of Ryan (US PG Publication 2004/0044833 A1), and in further view of Schumacher (US Patent 5,502,621). The minor differences between claim 21 (selected as representative of the remaining base claims of the instant application as it is the most comprehensive of the set) of the instant application and claim 37 of the co-pending application are presented in the matrix below.

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Instant Application 10/822,275	Co-pending Application 11/417,389
Claim 21:	Claim 37:
A computer system, comprising: a data input device;	A memory module, comprising:
a data output device;	
a processor coupled to the data input and data output devices;	
a controller electrically coupled to the processor, the controller being operable to receive and transmit memory signals on a high-speed data link;	
at least one memory module coupled to the controller, each memory module comprising:	
a circuit board;	a circuit board;
a memory hub positioned on the circuit board;	a memory controller positioned on the circuit board;
a plurality of pairs of memory devices positioned around the memory hub and arranged in pairs on the same side of the circuit board as one another,	a plurality of memory devices positioned around the memory hub and arranged in pairs,
each memory device having the same physical layout including pins associated with a first functional group of signals adjacent a first end of each memory device and pins associated with a second functional group of signals adjacent a second end of each memory device, and the first end of each device in each pair being positioned substantially abutting one another on the circuit board;	each memory device having a first edge and a second edge opposite the first edge and further having a same arrangement of electrical terminals relative to the first and second edges, including a first group of electrical terminals to which first-type signals are coupled and a second group of electrical terminals to which second-type signals are coupled, the first group of electrical terminals positioned adjacent the first edge and the second group of electrical terminals positioned adjacent the second edge, the second edge of each device in a pair positioned adjacent a second edge of a memory device in one of the other pairs
and an edge connector positioned along an edge of the circuit board and coupled to the memory hub.	a connector coupled to the memory hub and configured to couple at least one of command, address, and data signals to the memory hub

Note Ryan teaches several of the elements that claim 37 of Application '379 lacks, including:

a data input device (Fig. 3 (311));

a data output device (Fig. 3 (312));

a processor coupled to the data input and data output devices (Fig. 3

(304));

a controller electrically coupled to the processor, the controller being operable to receive and transmit memory signals on a high-speed data link (paragraph 0019, all lines);

a memory hub positioned on the circuit board (Fig. 3 element 208);
memory devices on the same side of a circuit board (again, Fig. 3); and
an edge connector positioned along the edge of the circuit board (memory modules are described as being DIMM devices – paragraph 0006, all lines).

It would have been obvious to one of ordinary skill in the art at the time of the invention for Application '379 to further include Ryan's system and method for optimizing interconnections of memory devices in a multichip module into his own system for mirroring memory devices. By doing so, Application '379 would be able to exploit the timing benefits of Ryan's system including minimizing skew, and maximizing signal integrity between the hub and memory devices by positioning them equidistant from a centralized hub as taught by Ryan in paragraphs 0012 through 0013, all lines.

Despite these teachings Ryan fails to teach each memory device being positioned in a pairs, in which the paired devices are arranged such that each respective device has the same pinout, yet one is rotated 180 degrees with respect to the board such that first and second sets of functional pins are substantially abutting each other.

Schumacher however teaches arranging ICs in a paired configuration such that one device is rotated 180 degrees with respect to the board – Fig. 4, devices 410 and 415 are ICs with the same pinout, just mirrored with respect to the vertical axis (i.e. 180

degree rotation). Schumacher teaches this configuration (i.e. chips substantially abutting one another) in order to keep similar functional pin groupings together (col. 3, lines 40-56).

It would have been obvious to one of ordinary skill in the art at the time of the invention for Application '379 to further include Schumacher's system of mirrored pin assignment for two sided multi-chip layout into his own system for mirroring memory devices. By doing so, Application '379 would be able to connect the memory devices of the memory system with a more simplified lead routing scheme, which in turn would lead to a reduction of the number of layers in the PCB as taught by Schumacher in col. 2 lines 35-39.

9. The remaining claims 1-20 and 22-30 are further rejected as being obvious over claim 37 of Application '379 in further view of Ryan (US PG Publication 2004/0044833 A1) in further view of Schumacher (US Patent 5,502,621). The minor differences between the copending claims and the pending claims of the instant application are rendered obvious in view of the combined teachings of Ryan and Schumacher based on the rationale set forth under the art rejections of these claims as discussed *supra*. This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Response to Arguments

10. The rejections set forth under 35 U.S.C. § 112(2) have been fully considered, however they are not persuasive.

As for claims 8 and 19, Applicant failed to address the previous rejections either in argument or by way of amendment, therefore these rejections are maintained and restated above.

As for claim 29, Examiner maintains that the phrase "substantially parallel edges of the circuit board" render the claim indefinite, Applicant's arguments notwithstanding. Applicant cites several Federal Circuit cases containing opinions, which allegedly concluded that the modifier "substantially" was in fact definite. While Examiner concedes that the use of "substantially" does not necessarily preclude a particular limitation from being definite, Applicant is respectfully reminded that "[e]ven if the specification uses the same term of degree as in the claim, a rejection may be proper if the scope of the term is not understood when read in light of the specification" pursuant to MPEP § 2173.05(b). Absent guidance with respect to the scope of this term within the instant specification, Examiner maintains it is not understood, hence the phrase is held to be indefinite.

Applicant additionally cites a Federal Circuit case finding the phrase "generally parallel" as being sufficiently definite without any further definition. Examiner however maintains (in addition to the fact that "generally" and "substantially" are two completely different adverbs, and are not interchangeable) that phrases such as "substantially parallel" and "substantially perpendicular" as recited in the instant claim introduce ambiguity into the claim (i.e. is "substantially parallel" to mean "more parallel than perpendicular?"--if so, is a 45 degree angle "substantially perpendicular", substantially parallel", neither, or both?). Examiner further maintains that Applicant amended claims

10, 14, 21 and 26 with "substantially" language in order to distinguish them over the previously cited prior art. It is therefore absolutely imperative for Examiner to fully appreciate the meaning of "substantially parallel", "substantially perpendicular" and "substantially abutting", *in light of the original specification*, in order to determine if such an amendment in fact overcomes the prior art. For at least these reasons the claim are therefore indefinite, as Examiner cannot properly construe the scope of these claims in present their form.

11. Applicant's arguments with respect to rejections set forth under obviousness-type double patenting and 35 USC § 103(a) have been considered but they are not persuasive.

Applicant's general allegation that the rejection of claims 1-30 for obviousness-type double patenting is improper is rendered moot, as Examiner maintains that claims 1-30 are rendered obvious over Application '389 in view of Ryan (US PG Publication 2004/0044833 A1), and in further view of Schumacher (US Patent 5,502,621) per the rejections *supra*, and arguments *infra*.

With respect to the previous prior art rejections (i.e. 35 U.S.C § 103(a)), Applicant sets forth a general allegation that Schumacher fails to teach that integrated circuits on the same side of the circuit board abut one another or are arranged in pairs that are perpendicular to adjacent pairs (i.e. limitations recited in the independent claims). This argument however is not persuasive, as Examiner maintains that Ryan in view of Schumacher, (rather than Schumacher alone as asserted by Applicant), render the independent claims obvious per the rejections presented *supra*. Applicant is

respectfully reminded that “[o]ne cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986)”, pursuant to MPEP § 2145 (paragraph IV.).

Applicant further contends that the teachings of Schumacher do not suggest modifications of Ryan. More specifically, Applicant contends that Ryan’s “individual buses radiate outwardly from the memory hub and directly connect each memory device to the memory hub without crossing. There is therefore no possibility of crossover and no simplification would occur from using the arrangement of Schumacher.” In sum, Applicant asserts “therefore [it] would not be obvious to combine Schumacher and Ryan to achieve the disclosed embodiment.”

This argument however is not persuasive. Examiner maintains (as per the previous and current rejections), that it would have been obvious to one of ordinary skill in the art at the time of the invention for Ryan to further include Schumacher’s system of mirrored pin assignment for two sided multi-chip layout into his own system and method for optimizing interconnections of memory devices in a multichip module. By doing so, Ryan would be able to connect the memory devices of his memory system with a more simplified lead routing scheme, which in turn would lead to a reduction of the number of layers in the PCB as taught by Schumacher in col. 2 lines 35-39. It is worthy to note that Ryan’s system is aimed at positioning memory devices around a centralized memory hub *at equal lengths* in order to *optimize the data signal speed and integrity* (see paragraph 0013, all lines of Ryan). Schumacher is directed to specifically orienting

memory devices such that the package leads of similar types substantially abut one another, hence maximizing the efficiency of *PCB layering and trace routing* (col. 2, lines 32-38). It would have been obvious to one of ordinary skill in the art for Ryan to exploit the benefits of efficient PCB layering and trace routing, into his system of memory device spatial optimization for signal integrity as per the rejections discussed *supra*.

Applicant further alleges that specific limitations of each of the independent claims (i.e. 1, 10, 14, 21 and 26) are not taught by the cited references, however these arguments amount to a general allegation that the claims are patentably distinct, and no further explanation is set forth. These general allegations are therefore not persuasive, and the rejections are maintained as explained in the arguments and rejections discussed *supra*.

Applicant's general allegation that all dependant claims are allowable for at least further limiting allegedly allowable features of each of their respective base claims is not persuasive, as Examiner maintains that the cited prior art renders all instant claims obvious per the arguments and rejections set forth *supra*.

Conclusion

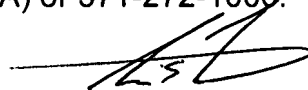
12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Craig E. Walter whose telephone number is (571) 272-8154. The examiner can normally be reached on 8:30a - 5:00p M-F.

13. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hyung S. Sough can be reached on (571) 272-6799. The fax phone

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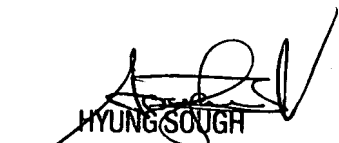
number for the organization where this application or proceeding is assigned is 571-273-8300.

14. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



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5-25-07